

CLAIMS

I claim:

1. A device for rotating a user's lower leg during leg flexion and extension exercise comprising:
 - a. a cuff to securely surround the tibial portion of a user's leg;
 - b. two rotational drums positioned on each side of said cuff;
 - c. a sheet attached to each of said rotational drums and said cuff so that rotation of said drums imparts a rotational force to the tibial portion of the leg;
 - d. means for rotating said drums;
 - e. means for limiting range of said flexion and extension;
 - f. means for generating an exercise resistance during leg flexion and extension.
2. The device of claim 1 further comprising a bar connecting the rotational drums so that said rotational drums remain parallel to each other during exercise.
3. The device of claim 1 wherein means for rotating said drums comprises:
 - a. a vertical bar rigidly connected at one end to one of said rotational drums to rotate said rotational drum.
4. The device of claim 3 wherein means for limiting range of said flexion and extension comprises:
 - a. a range limiter having a passage in which at least a portion of said vertical bar is disposed such that said range limiter assembly does not rotate with rotation of said vertical bar.
5. The device of claim 4 wherein the range limiter further comprises:
 - a. a range limiter track;
 - b. an immovable range limiter bar extending into said range limiter track to limit rotation of said range limiter assembly.
6. The device of claim 5 wherein the range limiter further comprises:

- a. a plurality of pin-receiving passages for receiving a range limiter pin, so that the range limiter pin can constrain the rotational range of the range limiter assembly.
7. The device of claim 5 wherein the range limiter track is an arc of approximately 120° of a notional circle centered on the center of rotation of said range limiter.
8. The device of claim 5 further comprising:
- a. a load transmission bar connected to said range limiter for transmitting exercise resistance.
9. The device of claim 8 further comprising:
- a. a reversible load transmission disk connected to the load transmission bar to transmit exercise resistance to said range limiter.
10. The device of claim 9 wherein the exercise resistance is for leg extension exercise.
11. The device of claim 9 wherein the exercise resistance is for leg curl exercise.
12. The device of any of claims 9-11 further comprising means for generating exercise resistance.
13. The device of claim 12 wherein the means for generating exercise resistance is a weight stack.
14. The device of claim 1 wherein said cuff comprises:
- a. a calf pad connected to said sheet, said calf pad having a first edge and a second edge;
 - b. a first shin pad connected to said sheet and connected to said first edge of said calf pad;
 - c. a second shin pad connected to said sheet and connected to said second edge of said calf pad, wherein said second shin pad comprises:

- i. a plurality of pads;
- ii. a plurality of belt guides connected to said plurality of pads;
- d. straps connected to said second edge of said calf pad that traverse through said belt guides, wherein pulling the belts tightens the cuff around the tibial portion of a leg;
- e. a fastener assembly for securing the straps to the sheet.

15. The device of claim 1 further comprising:

- a. a resistance adjustment pin connected to said vertical bar;
- b. a resistance brake connected to said resistance adjustment pin in braking connection with said range limiter such that said resistance adjustment pin controls the force required to rotate said rotational drum.

16. The device of claim 1 further comprising:

- a. a handle attached to said vertical bar so that the user can rotate said rotational drum by rotating said handle.

17. A device for rotating a user's lower leg during leg extension and flexion treatment comprising:

- a. a cuff to securely surround the tibial portion of a leg;
- b. a first and a second rotational drum positioned on each side of said cuff;
- c. a sheet attached to each of said rotational drums and said cuff so that rotation of said drums imparts a rotational force to the tibial portion of the leg;
- d. means for rotating said drums.

18. The device of claim 17 wherein means for rotating said drums comprises:

- a. a first vertical bar rigidly connected at one end to said first rotational drum to rotate said first rotational drum;
- b. a second vertical bar rigidly connected at one end to said second rotational drum to rotate said second rotational drum;

- c. a first rotational assembly with a passage for receiving a portion of said first vertical bar;
- d. a second rotational assembly with a passage for receiving a portion of said second vertical bar.

19. The device of claim 18 further comprising:

- a. a resistance adjustment pin connected to said vertical bar;
- b. a resistance brake connected to said resistance adjustment pin in braking connection with said rotational assembly such that said resistance adjustment pin controls the force required to rotate said rotational drum.

20. The device of claim 18 further comprising:

- a. a treatment connection bar connecting said first rotational assembly with said second rotational assembly to provide stability to the device;
- b. a thigh rest support that envelopes the treatment connection bar.

21. The device of claim 20 further comprising:

- a. a base board attached to the thigh rest support;
- b. a belt attached to the base board for securing the base board to a treatment table;
- c. one or more hooks attached to each of said rotational drums for receiving an elastic belt to generate exercise resistance.

22. The device of claim 17 wherein the first rotational assembly is connected to an isokinetic testing machine.

23. A method for exercising a user's leg comprising:

- a. providing a device of any of claims 1-22;
- b. inserting a user's lower leg into the device of step (a);
- c. rotating the lower leg by a rotational angle;
- d. flexing/extending the rotated leg under an exercise resistance to exercise the user's leg.

24. A method for exercising a user's leg comprising:

- a. providing a lower leg tibial holder;
- b. inserting a lower leg into the lower leg tibial holder;
- c. rotating the lower leg by a rotational angle by rotating the lower leg tibial holder;
- d. flexing/extending the rotated leg under an exercise resistance to exercise the user's leg.

25. The method of claim 24 wherein the user's leg comprises an osteoarthritic knee.